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THE JOURNAL OF PHILOSOPHY

PROBABILITY, NATURAL LAW, AND EMERGENCE[1]

I. PROBABILITY AND PURPOSE

AN ESSENTIAL characteristic of those views in philosophy which are classed under the term "idealism" is the belief in purpose. By "purpose" seems to be implied the notion that the affairs of the universe are guided by some time-spanning agency in such a fashion that certain ends and values are progressively being realized. The guiding agency is usually conceived to be a cosmic self of some sort, and, by analogy, is held to function as conscious prevision does in the guidance of human conduct.

In contrast with the conception of a universe guided by a purposive agency there is presented by the materialist the conception of a mechanical universe. A "mechanical" universe is one devoid of purpose. It is generally agreed that a mechanical world would be one in which whatever occurs happens by "chance," where by chance is meant the absence of a "spiritual" guiding force. Chance and purpose are thus opposed to each other. And in this manner it appears that the contrast between idealism and mechanism rests upon conclusions drawn from considerations of probability. The idealist argues that if there were no purposive agency active in controlling the course of nature the present cosmos, with its existing evolutionary products, would not have occurred.

As an illustration of the idealistic thesis I may here refer to the supposed proof for the proposition that the existence of an uncontrolled universe throughout all eternity is infinitely improbable. This demonstration rests on the general tendency of the ether to gain energy at the expense of matter. Energy tends to become unavailable through radiation of energy into space in the form of heat. This tendency towards the degradation of energy should eventually result in an equilibrium condition in which there is nothing "doing" (*wärmetod*). Some idealists have triumphantly pointed out that since, for science, the universe has already had an infinite time in the past to run down, and since it nevertheless is still a going concern, there must be a creative source of energy in the cosmos. It seems to me that a more plausible position would be to

[1] This paper was read in part before the Western Division of the American Philosophical Association, at the Easter (1926) meeting in Chicago.

regard this idealistic entity not as a source of energy, but as a cosmic sorting demon, which, like Maxwell's hypothetical creature, could interfere with the normally irreversible tendency towards an equilibrium.

This argument now seems less plausible than it appeared in the past. For one thing, it is not at all certain that energy can wander off to infinity, for it is held by the advocates of *Einsteinismus* that we are living in a finite, though unbounded, curvilinear universe. For another thing, scientists are now entertaining the idea that, complementary to the process of the conversion of matter into energy, there is the reciprocal process whereby the energy radiated out into space is again transformed into matter. If this be true one argument for the existence of a cosmic guiding agency will have been shown to be fallacious.

The notion of possible universes may also be approached from a slightly different viewpoint. Like Leibniz, some idealists take the stand that this is the best of all possible universes. Bertrand Russell, on the other hand, seems to be convinced that this is the worst of all possible universes. But both Leibniz and Russell seem to agree that the actual universe is only a privileged position of possible universes. This problem of whether any meaning can be attached to the question: Could the universe have been different from what it actually is, goes to the very heart of the philosophy of science. Logicians who are interested in logically possible universes, and mathematicians who are interested in conceptual domains having no necessary existential embodiments, seem to think that the present world is only one out of an indefinite number of possible universes. To be sure, they are not certain as to which of these possible universes the present actual universe corresponds. But that is an experimental problem for natural science. Unless we concede the notion of possible universes we seem to remove the basis for postulational method in mathematics, and, at the same time, deny the justification for any kind of debate between teleologists and mechanists.

Let us grant that the argument is not meaningless, and that the teleologist in asserting purpose and the mechanist in denying purpose are not talking nonsense. The next fact which becomes obvious is that it has been very difficult for the idealist to state the nature and precise mode of attack of purposive agencies. In general, however, it seems to me to be a fair statement to say that there are three possible ways of going about demonstrating the reality of purpose: (*a*) through arguments based upon considerations of probability, as we have just seen; and (*b*) through a knowledge of the nexus of the physical and the psychical; and (*c*) through a knowledge of the nature of time. I do not think that these methods can remain inde-

pendent of each other. That is, conclusions arrived at through one mode of approach must square with conclusions drawn from another method of inference. I shall first discuss the question of whether any valid conclusions can be drawn from existing arguments based upon the calculations of probability. But before proceeding with this, certain general remarks concerning the theory of probability itself are in order.

II. Epistemological Aspects of Probability

An inescapable nemesis seems to stalk the trail of the philosopher. It seems inevitable that when a philosopher sets out to philosophize he finds it essential to justify the necessity for philosophizing. Epistemology is this mighty discipline which the philosopher creates to justify his profession. By its means the philosopher brings the profane mind under conviction.

And so it is when we come to the problems of probability. In addition to whatever inherent difficulties which attach to the mathematical treatment of probability, there are certain epistemological problems which complicate the matter. Along with those problems common to all inductive science, there are in addition the questions concerning the objectivity of "chance," the reality of contingency, *etc.* Several such epistemological problems may be singled out:

(*A*) A common definition of probability in standard treatises[2] on the subject is this: "The probability of the happening of an event is the ratio of the number of cases favorable to that event to the total number of possible cases." But it is usually added that probability is the measure of our degree of knowledge of the data on which we must rely in predicting whether the event will or will not occur. That is, an event which appears to us as merely probable may be absolutely necessary. In this view probable knowledge does not imply contingency or indetermination, but only that our knowledge is insufficient to predict the event. This interpretation seems to render "chance" subjective. Does this imply that "law" is also subjective? Events are said to be due to chance when they are not subject to law. But to the philosopher who is interested in the epistemological problem, which scientists find it convenient to ignore, the question of whether law (absence of chance) is objective or subjective remains to be answered.

(*B*) Another corollary to the theory of probability is that in calculating probabilities it must be assumed that all events due to chance are composed of "equally probable" independent events. An excellent illustration of this assumption in operation is given in the second law of thermodynamics, of which I shall have more to

[2] Quoted from N. R. Campbell's *Physics: The Elements*, 1920, p. 165.

say later. The same assumption is made when tossing coins. If the formula is not satisfied in the first few trials we are informed that it will be more closely approximated the longer we continue the trials. But when we are told that the demands of the theory will be met in the long run one suspects that the run is made just long enough to satisfy the theory. The faith in the formula ultimately reduces to a faith in the "uniformity of nature." But this principle is itself the result of induction, and can not be used as a logical justification for the theory of probability.

Moreover, it is recognized that the term "equally probable" begs the question. It can be said, of course, that it is equally as probable that one will get heads as tails when the penny tossed is well made, but, in turn, one suspects that a "well made" penny would be one which satisfies the orthodox theory. And the notion that the events must be "independent" is an assumption which, though it seems to be necessary, is, as I shall try to show later, really not adhered to when we calculate the probability of an individual event considered as a member of a series of operations.

It therefore seems that the question of what the ultimate justification for the faith in the theory of probability may be (aside from the pragmatic justification that it works—sometimes) still remains to be answered.

Here we have several epistemological problems which many philosophers might like to see dealt with before launching out into an application of the theory of probability to physical, biological, and psychical systems. But is an answer to these questions an indispensable prelude to the concrete application of the theory of probability? I do not see that it is.

If we grant the contention of those philosophers who argue that epistemology is the prerequisite to a theory of empirical reality we seem to be faced with the gloomy prospect of finding ourselves spending the remainder of time debating theories of knowledge, with no hope of ever coming into fertile intercourse with the natural sciences. But we, being ephemeral creatures, do not have the remainder of eternity at our disposal, and I shall therefore proceed on the assumption that ignorance of why the theory of probability works does not compel us to refrain from using the tools with which logic and mathematics supply us. We thus find ourselves back at our starting point.

III. Mechanism vs. Teleology

There are many statements of the argument for purpose. The following quotation from J. Arthur Thomson's *Concerning Evolution* may be given. After discussing Professor Chamberlaine's tidal theory of the origin of the solar system Professor Thomson concludes:

"If this theory is true, it suggests that the sequence of events in the order of nature must have been well thought out. The mere fact that it led eventually to the evolution of astronomers who devised such an ingenious theory seems enough to show that the star was not passing at random. Even hard-shelled physicists are agreed as to the incomprehensibility (not impossibility) of our cosmos emerging from chance and chaos" (p. 9). Nor does it seem likely to this biologist that life should have arisen here on earth through change. "Our point, then," he continues, "is that a multitude of 'preparations' conspired together to make the earth a home for life: the making of an atmosphere and a hydrosphere, the properties of water and carbonic acid gas separately and together, the properties and abundance of carbon, hydrogen and oxygen near the surface of the cooling earth, the ready assumption of a colloidal state by complex carbon compounds, the regulative influence of the meteorological cycle. . . . From a broader basis we may say that it looks as if Inorganic Nature was as it is with a purpose" (pp. 27–28, *ibid.*).

The argument against mechanism has also been well stated by Bergson when he attempts to show that a series of random variations, occurring in an accidental order, could not have produced a complex organ such as the eye. A more dramatic version of this view was given by J. J. Murphy[3] when, after the publication of Darwin's *Origin of Species*, he affirmed: "It is probably no exaggeration to suppose that in order to improve such an organ as the eye at all, it must be improved in ten different ways at once, and the improbability of any complex organ being produced and brought to perfection in any such way is an improbability of the same kind and degree as that of producing a poem or a mathematical demonstration by throwing letters at random on a table."

These, I believe, are fair samples of this type of argument by means of which the reality of purpose in nature is supposed to be proved. What is the reply which can be made by the mechanist?

A popular argument presented by non-vitalistic biologists to explain the emergence of a particular result in evolution runs as follows: Admitting that any combination of factors statistically is of a very low degree of probability, nevertheless, so long as it is not zero, if you give nature a sufficiently long time in which to work, every possible permutation will at some time be produced. As a concrete example let us consider one of the most improbable fortuitous configurations possible, namely, that necessary for the existence of life. Let us recall that a hostess can arrange twenty diners around a table

[3] Quoted from Sir Arthur Keith's Huxley Lecture on "The Adaptational Machinery Concerned in the Evolution of Man's Body," *Nature*, 1923, Vol. 112, 257–268.

in more than two million million million different ways. Now in a single albumen molecule there are not merely twenty atoms, but there may be a thousand atoms. Remembering that an albumen molecule is very simple compared with the simplest organism, how long will it take to produce one of the fluctuations known as one of the protoplasms? I do not care to undertake the calculation. It is unnecessary. All that the mechanist need do is ask the question, "yes, but who knows how many births and deaths of solar systems were necessary before the present world with its existing population of organisms was produced?"

But the advocate of purpose might meet this reply in this manner: Previously we have supposed that the successfulness of any mutation depends on the convergence or intersection of several lines of differentiation—such as the simultaneous modification of the lense, retina, etc., in the eye. Let us note further that the production of any given variation in any one line of differentiation is governed by a series of causes indefinitely complex. Does it not follow that the possibility that these mutually necessary variations in different lines will occur simultaneously is not only infinitely improbable, but that it is an improbability of a higher order of infinity? In terms of the mathematical analogy, the likelihood of any one point of a line (an infinite aggregate) meeting any other specified point in another line in the same plane would be of the order of improbability infinity squared.

But the non-vitalist can always reply that there is as much time as there are levels of improbability. Even if we grant, as Professor C. J. Keyser says, that infinities may rise upon each other in a summitless hierarchy, we find that we still have time to bring about the real permutations. A concrete example will exhibit this. Mathematicians tell us that there are infinity cubed circles in a plane. The probability that a coin tossed upon a table will fall upon a specified circle of its own size is infinity squared improbable. Yet at every toss of the coin this infinity squared improbable event is produced—and it makes no difference how large the table is.

But the fallacy in this argument, on both sides, seems to me to lie in this: It is very doubtful whether probability has any meaning when applied to transfinite classes, either of the linear or the denumerable type. This is in accord with the position taken by J. M. Keynes in his *Treatise on Probability* (Ch. XXII), when he states that if the facts or propositions with which the argument is concerned belong to a finite system, then probable knowledge can validly be obtained by means of inductive argument.

Another fact to be carefully born in mind in questions of this sort is that we are here dealing with the probability of a combination

of events which are undoubtedly not independent. This, of course, very materially influences the numerical value of such probability, in accordance with a very fundamental principle of the calculus of variations. This may be illustrated by again quoting from Sir Arthur Keith's Huxley Lecture: In the case of vision the researches of Dr. Warren H. Lewis have shown how the optic cup, which ultimately forms the retina of the eye, grows from the wall of the brain towards the embryonic skin or ectoderm. "When the cup comes into contact with the ectoderm, the underlying cells begin to proliferate and arrange themselves so as to form a crystalline lense. Dr. Lewis transplanted the outgrowing optic cups of tadpoles, and found, if they were placed under the extoderm of the neck or belly, that the result was the same; an optic cup caused the underlying cutaneous cells to alter their nature and form a lense. Dr. Lewis realized the significance of his discovery; in the developing embryo, although only of certain species, one group of living cells can enslave and control the behavior of another group. He gave us a glimpse of the kind of evolutionary machinery employed in fashioning a highly purposive structure such as an eye."

Applied to the world as a whole the effect of such studies on functional interdependence is to strengthen the doctrine of singularism. It seems to add confirmation to the belief in the internality of relations, as opposed to the doctrine of the externality of relations. But does this, in itself, provide an answer to the question as to whether this singularism is to be taken to support physical monism rather than the underlying reality of the idealistic absolute? Professor W. D. MacMillan [4] has told us that "atoms, living beings, stars and galaxies are permanent forms of the universe," but he has not stated what the philosophical implications of this view are. I do not wish to assume the responsibility of trying to state them for him. We must therefore leave the problem open, hoping that evidence from other fields will enable us to decide the matter.

IV. Probability, Thermodynamics and Order

A new turn and an added importance have been given to the philosophy of probability by the wider application of statistical method. The statistical method has been especially successful in the study of physico-chemical systems, providing, among other things, the basis for the second law of thermodynamics. Maxwell first enunciated the theorem that the components of molecular velocities are distributed amongst the molecules according to the same law as the errors are in the theory of observations. Later scientists have

[4] "Some Mathematical Aspects of Cosmology," *Science*, 1925, Vol. LXII, p. 127.

reinterpreted Maxwell's theorem in terms of probability to express the fact that nature prefers the more probable states to the less probable states. The mathematical expression for this probability is termed *entropy*.[5]

As we have previously seen, the calculations of probability are based on the idea that all events due to chance are composed of equally probable independent events. Such a typically random distribution of collisions is assumed in the second law of energetics. This appears in Boltzmann's gas theory in the hypothesis of elementary disorder. I shall have occasion later to question this assumption that the individual molecules are entirely independent of each other.

The effect of the increased usage of statistical method has been to recognize more clearly two types of laws in nature: (*a*) causal laws giving rigid determinism and predictability, and (*b*) statistical laws yielding mere probability and introducing indeterminism into the calculations. A dynamical or causal law completely eliminates contingency, and implies an ability to visualize the mechanisms in operation. But in the statistical law, concerned with the calculation of mean values, the individual elements of which the operations are concerned are not visualized. Let us set down the contrasts between these two types of laws:

Dynamical Laws	*Statistical Laws*
1. Illustrated by the principle of *least action* (including the first law of energetics).	Illustrated by the second law of energetics (or thermodynamics).
2. Causal (necessary).	Probable (contingency).
3. Microscopic or "atomic" processes visualized.	Macroscopic states (or averaged results).
4. Real mechanisms.	Phenomenal viewpoint.
5. Reversible processes.	Irreversible processes.

Here we see that the atomic processes of microscopic mechanisms are reversible (sometimes periodic) and subject to necessary causal laws, whereas the macroscopic states represent the mean value of a large number of individual processes.

It is sometimes supposed that the second law, expressing as it does the irreversible character of natural processes, is a non-mechanical law—since mechanical processes are reversible. But the second law does not disturb the foundations of the classical kinetic theory. Statistical mechanics, in fact, rests upon the conceptions of the

[5] The mathematical statement of the relation of entropy to probability is given in M. Planck's *Survey of Physics* and C. E. Guye's *Physico-Chemical Evolution*.

mechanical theory, *i.e.*, mass particles in motion. The real distinction lies in the point of view. The dualism between reversible and irreversible is associated with the dualism of the atomistic and the phenomenal viewpoints. In support of this I may quote from Max Planck's *Survey of Physics* as follows: "It appears . . . that the duality between statistical and dynamical laws is intimately associated with the duality between macrocosm and microcosm, and this we must regard as a fact substantiated by experiment" (p. 103).

Let us now return to the notion that in the calculation of probabilities it is supposed that the events are independent of each other, in the sense that they are "equally probable." This (relative) independence seems to be necessary to the theory. But in reality the events are not absolutely independent of each other. This seems to me to be indicated by the fact that the same event is endowed with two different probabilities, according to the circumstances which are set. As an individual event its probability may be quite different from its probability when the same event is calculated as a member of a series. In the latter case the probability is altered according to the history of the previous members of the series. Moreover, I do not see that there is any difference in principle between calculating the probability of an event as a member of a temporal series of events and the calculation of the probability of a number of events at any one moment. The meaning of this is that while events mathematically may be considered as independent, physically they are not independent. This is in harmony with the statement that probable events are really necessary.

Now applying this to the problem of molecular paths determined by the collisions, we see that any path chosen by a molecule is not due to "chance" encounters, but as an atomic fact the path is rigidly determined by dynamic laws. The way in which the molecule will rebound after a collision is determined by the direction, momentum, angle of impingement, *etc.*, of the two moving molecules as they strike each other. In the end the path of each molecule is a function of the total distribution of all the remaining particles. The events are not physically independent of each other. The mean free path of each molecule is a function of the total *field* (as I shall call it). The radiant energy of the field in which the molecules are imbedded helps to determine the molecular agitation. This view, it may be pointed out, is in line with Professor W. Köhler's anti-atomistic doctrine when he declares that the atomic products of analysis, like the *limit* of a *differential*, are artefacts.

This total field is the phenomenal configuration which defines the macroscopic state. Since the behavior of the individual elements is determined by the larger whole there may be said to be purpose

involved, where by "purpose" is meant the tendency to bring order out of disorderly or chaotic activities of individual events. There is teleology even in the lowest types of physical processes, but it is not teleology in the ordinary sense.

The second law of thermodynamics is sometimes construed to express the tendency of orderly motion to become disorderly or mixed up. But this disorderly tendency is summarized into a new order, which is that of the macroscopic or phenomenal state. The way in which an averaging process may give the appearance of continuity is seen in such seemingly continuous media as air and water; and yet we know they can be analyzed into their molecular constituents.

There are, then, two kinds of order. Let us call these two kinds of order levels of simplicity. We then have the first level of simplicity, which is a simple simplicity, and the second level of simplicity, which is a complex simplicity. The first level is represented by microscopic activities, and the second by macroscopic or phenomenal states. Nature apparently is not satisfied with the lower level, but always strives for the higher level of simplicity.

V. Life and Emergents

With this as a background we are now prepared to show the connection of these two levels of simplicity with vital phenomena. The relevance of the second law of thermodynamics to vital systems has been much debated. If it can be demonstrated that biochemical systems are not amenable to the principle it is evident, as the vitalist holds, that organic behavior is not deducible from the behavior of inorganic systems. Hans Driesch, it will be remembered, has suggested that *entelechy* may suspend the operation of this law. Bergson has also supposed that *l'élan vital* may retard the tendency towards the degradation of energy. This is the position of those who hold that life is a unique principle of some sort.

On the other hand, the *gestalt*-psychologists, Professors W. Köhler and K. Koffka especially, attempt to explain such an apparently purposive form of behavior as the visual fixation response (involving the eye movements of accommodation and convergence) by assuming that every process which proceeds at all to an end situation, independent of time, the mode of distribution shifts in the direction of a minimum of configurative energy.[6] The fixation response results from the tendency to avert double images and from the tendency to obtain the greatest possible purview of surrounding space.

It is claimed by Köhler that this adaptive response is in harmony

[6] Quoted from Köhler's *Physische Gestalten*, 1920, p. 250. See also Koffka's *The Growth of the Mind*, 1925, p. 364, note 92.

with Nernst's interpretation of the second law of thermodynamics. The doctrine that entropy tends towards a maximum is equivalent to the statement that, with regard to the reactions which proceed at a constant temperature and volume, the change goes on until the free energy of the system reaches a minimum. Here free energy is equal to the maximum work done in an isothermal change, and in Nernst's interpretation this means the tendency to decrease the potential energy of the system to a minimum. But, you may ask, would not closing the eyelids satisfy more completely the demand for minimal potential energy? No, because, given the stimulus, nature strives to attain the second level of simplicity, and thus the law of "greatest horopter" is found to be in accord with the second law of thermodynamics.

Here we find the vitalists claiming that life may triumph over the second law, while the non-vitalists (gestaltists are not "mechanists") are using the same principle to explain what seems to be a purposive response. The question of whether life does or does not obey this law is an experimental problem, but it seems evident that even if the law applies completely this no longer compels us to accept "mechanism."

Another illustration of the way in which statistical results may be held to account for the transition from relative disorder to orderliness may be taken from linguistics. The tendency towards what Royce called "mutual aggregation" is seen in the building up of the categories of language, such as verbs, nouns, adverbs, *etc.*, with their various uniformities of conjugations, declensions, inflections, *etc.* Students of the science of language do not assign causes for linguistic changes. These changes appear to be taking place unconsciously and to be going on all the time. Yet "chance" has apparently produced a definite sequence of changes which eventually result in the assimilation into what might be called grammatical species. If this be true even the products of social evolution may be explained without the introduction of guiding principles *ab extra.*

Now if order can be produced from the "chaos" of random distributions through an averaging process, perhaps the "emergents" which are figuring so prominently in the speculations of contemporary evolutionary philosophy are but the "central tendencies" of statistical distributions. However, this seems to be a problem quite independent of the existence of purpose, for emergent evolution provides an escape from mechanism without necessarily giving us a purposive universe.

VI. Probability and Time

It was earlier suggested that the three methods of demonstrating the reality of purpose may not be independent of each other. Thus since probabilities apply to aggregates in a spatio-temporal world the first and the third methods have common ground. And if mind is a form of time, as Dr. S. Alexander argues, the second and the third overlap. And this is my own view also.

I should like the reader to entertain the hypothesis that the macroscopic state, involving a field of radiant energy (infra-red rays in thermodynamic systems), really constitutes a continuum. Then from the macroscopic viewpoint the paths of the individual molecules are determined. But (modernizing Spinoza) if the molecules were conscious (and I believe they possess psychic life) they might convince themselves that they desired to take the paths they follow. They could not envisage the field state which, in part, determines their respective trajectories. But just as the second law of energetics brings a phenomenal emergent order out of the "random" activities of individual molecules, so the molecule would in turn determine the otherwise chaotic activities of its own constituent atoms by summarizing their behavior into a new order.

It can not here be shown how this view applies in detail to the "emergence" of consciousness out of the electrochemical reactions of cortical units. But on the basis of the fact that the equations of electromagnetism were carried over from the equations of hydrodynamics I am prepared to argue that the configurational brain processes *are* the phenomenal conscious structures when viewed in relation to their macroscopic fields of energy.[7]

And might we not suppose that just as the unordered motions of colliding molecules results in a new kind of emergent order, so the uncoördinated activities of individual human selves, with their cross-purposes, may result in some sort of order, perceptible to one who could survey the macroscopic manifestations of human enterprises? A little exercise of the imagination will bring this out.

An example of the similarity in behavior between living creatures and the behavior of inorganic units is as follows: It is found that the surface explored on the average by a large number of similar bacteria moving in a horizontal plane of liquid with a hydrostatic pressure which suits them is in accord with the statistical law of Brownian displacement, as governed by Carnot's principle (of the

[7] I can not now draw any parallels between this view and that of the gestalt psychologists. But I have developed this view in an equilibrium theory of consciousness, in a volume *The Alchemy of Light and Color*, which is to appear shortly, published in England by the Kegan Paul Co. In his *The Mystery of Mind*, L. T. Troland has also adopted a similar view.

second law of thermodynamics [8]). Carrying this analogy to a still higher level of life—that of human behavior—the writer has sometimes been struck by the resemblance between the behavior of crowds and the behavior of material particles acting under pressure. One can readily imagine that rapid motion-picture studies of a crowd of spectators leaving a ball-diamond after the game is really a study of molecules of a gas rushing out of an opening in the container. And yet we think the behavior of each individual man is purposive.

Of course, if human individuals are also constrained in their behavior the only kind of freedom possible for them is that which Dr. Alexander calls "enjoyed determinism." From my own point of view the distinction between mechanism and purpose is relative—depending on whether we are looking backwards or forwards along the line of nature's advance. And consciousness is associated with this asymmetric time order of evolution, which follows in accordance with the irreversible character of the second law of energetics. The interference of consciousness in mechanics may be very real, Dr. A. J. Lotka [9] informs us, and yet the course of events *appears* fully determined by the laws of dynamics. Through the energetics of "aimed collisions" purposive behavior, implying a correlation between a present state and a future eventuality, can occur in a material structure possessing a fund of free energy. In my own view the "aiming" is a function of the inter-relation between the individual and the total field.

The writer has been arguing for some time that the future can influence the present. The only physical evidence for this is found in such phenomena as those of atomic behavior, where the electrons appear to possess the knowledge of how to anticipate the future. Perhaps I may also appeal to the revolutionary theory of light which Professor G. N. Lewis [10] has presented, wherein the present and the past are tied together, as affording partial confirmation of the view that purpose implies a time-spanning energy.

VII. Cosmic Purpose

Whether there is purpose in the universe as a whole depends on the character of cosmic time.

We have seen how the dependence of events in the evolutionary order tends to support the singularistic doctrine of a cosmic self. This cosmic self, I believe, is the unitary field of energy which underlies the uniformity of nature. The fact that the postulates for inductive science, as Jules Lachelier insists in his *Du fondement de*

[8] This fact is taken from Ch. E. Guye's very significant contribution *Physico-Chemical Evolution*, p. 144.

[9] *Elements of Physical Biology*, 1925, p. 409.

[10] See his forthcoming book, *The Anatomy of Science*.

l'induction, reduce to a demand for the rationality of nature renders some such notion necessary. This eventually also carries with it the idea that there is a cosmic time associated with the emerging order of evolution.

This notion is held by some to conflict with the theory of relativity. In some interpretations of relativity the notion of an all-embracing time system is abandoned in favor of the notion of "local times." Thus Bertrand Russell feels that the well-known lines of the poet must be modified to read, "The one divine far-off event towards which some things move, and away from which other things move." I can not here give the reasons for my rejection of this interpretation,[11] but the following statement from J. H. Jeans[12] will indicate that Mr. Russell's version ignores certain facts of quantum mechanics: "We are here in unfamiliar regions of thought where our minds get frozen and refuse to operate. But one thing at least seems possible. It seems as though the deadly inevitability of cause and effect has ended, and we are in the presence of new possibilities of freedom which as yet we do not understand. Einstein's work on relativity changed the universe from a drama into a picture. It seems possible, as Weyl first suggested, that his work on quanta may provide the clue which is destined to change it back into a drama—no longer a drama in which all the parts have been written and the gestures prearranged before the curtain went up, but a drama in which all the actors choose their actions as the play proceeds—in fact, not a staged drama, but life." Perhaps in quantum phenomena, where again nature prefers more probable states, we glimpse something of the process of "emergence," in the sense in which we have used the term.

In the study of star-clusters astronomers find it feasible to apply on a very large scale those statistical laws of the kinetic theory of gases which are obeyed on a very small scale by molecules. But this need not mean that the motions of the stellar bodies are physically independent of each other. In our own corner of the cosmos we know that this is not true. Some astronomers hold that the solar system is not far from the galactic center of the group of stars constituting the Milky Way. It is supposed further that the Milky Way is a spiral nebula possessing, perhaps, a rotational speed. Again we ask, is this another case of random micro-movements being ordered into a new simplicity? And may all the heavenly bodies and

[11] The writer has developed a theory of time in an article "The Problem of Time in Science and Philosophy," which appears in the May issue of the *Philosophical Review,* 1926.

[12] "Space, Time, and the Universe," *Nature,* 1926, Vol. 117, p. 311.

systems be taking part in a super-time system—a sort of cosmic dance along the macroscopic time-line?

Whether this supposed time-line is circular, helical, or spiraline it is impossible to say. Aside from arguments by analogy I know of no *a priori* basis whereby the problem could be settled. But whatever its form may be, if the arguments herein set forth are valid, human beings are laboring in the creation of a higher order,—though we may be as ignorant as molecules as to the character of that order. Perhaps we are really building better than we know. If we could borrow the vision of emergent deity, and envisage the outlines of the edifice which human turmoil is constructing, perhaps as a phenomenological structure its majesty would be more inspiring and impressive than it is likely to appear to those who are now engaged in the travail of producing this cosmic *gestalt*.

OLIVER L. REISER.

UNIVERSITY OF PITTSBURGH.

FORM AND CONTENT: A STUDY IN PARADOX

THE acceptance of paradoxes has played a peculiar rôle in philosophy. It has led some thinkers to deny the reality of the world, and others to reject the laws of logic; it has delighted the Sophists and made mystics of the erudite saints; it is the great weapon of idealism and the reproach of rationalism.

But, in truth, there is no metaphysical virtue in paradox. The laws of logic have not produced it; the world does not contain it. The presence of a true paradox[1] in any proposition is essentially an index of non-significance, and therefore it is a symptom of some philosopher's muddle-mindedness, not an indictment of Reality or of logic. It is only what we say about Reality or about logic that is absurd, not the subject of the assertion.

The discovery that paradox is always indicative of a false premise is due to Bertrand Russell.[2] It was he who noted that the solution of Bolzano's paradoxes of the infinite, of Bradley's relation-antinomies, of the mediæval doctors' "insolubilia" and the more modern contradictions in mathematical theory, all require the abandonment of some tacitly accepted premise. But the test of ingenuity is to find

[1] I say a *true paradox* in distinction from those contradictions which rest upon a (none too subtle) change of view-point or meaning. Thus in *Principia Mathematica* "the greatest ordinal number" involves a true paradox, whereas "the least integer not nameable in fewer than nineteen syllables" does not.

[2] Statements of this discovery are scattered throughout his earlier metaphysical writings, especially those collected in *Mysticism and Logic* and *Our Knowledge of the External World*.

this premise. It is usually so deep-rooted in common sense that it is hard to explicate and harder yet to doubt. It requires great intellectual candor to question the validity of old implicit axioms, such as that the whole is always greater than any of its parts, or that any entities whatever may be combined to form a logical class. Fortunately, Mr. Russell is blessed with both candor and acumen, which led him to discover the fallacy of "illegitimate totalities."[3] This discovery has obviated some of the classical paradoxes of logic; the most delightful thing about it, however—the surest mark of its subtility and depth—is its aptness for killing metaphysical as well as logical chimæras. Its author's comments on Mr. Wittgenstein's mysticism are an instance of such philosophical solution by a pertinent inquiry into the possibility of some generally accepted notions.[4] The assumption of "language," which is the class of all symbolisms, or of the "world," which is the totality of facts, is not a safe assumption, as we learn by scrutinizing such common-sense constructs as "language" and "world."

Now there are few philosophers who are mystics concerning language, and few, perhaps, who are disturbed by accepting the unity of the world (in fact, Monism is frequently recommended as the answer to all mundane riddles); but one problem seems yet to reduce even "scientific philosophers," *i.e.*, logicians, to a sort of mysticism: that is the problem of relating the abstract form of anything to its specific content. That a logical form as such is an abstraction, is generally recognized; less generally, perhaps, the fact that every concrete object of our experience is an *interpretation* of familiar forms. Interpretation is the converse of abstraction; given a purely formal system of concepts, we are now in search of the *form with a content.* Interpretation seems to involve a going outside of logic for part of our material. When we interpret an abstract form, we are no longer dealing with this form alone, but find it in conjunction with some *non-logical* element, the "content."

This relation of form and content raises an interesting and difficult problem. At first sight it appears obvious that there can be such a relation; but if there is, then it can be expressed symbolically, as $R(f, c)$; and thereby we have transformed our empirical content into a term of the formal structure, *i.e.*, we have formalized it, and are no longer dealing with the non-logical content. Thus it seems there can be no such thing as the relation between the form of a thing and the content of that form, since this relation would entail a true paradox.

[3] For the evolution of this idea, compare Russell's *Principles of Mathematics*, Ch. X and App. B, with *Principia Mathematica*, Introd. to 2d ed., Ch. II, and App. C.

[4] L. Wittgenstein, *Tractatus Logico-Philosophicus*, pp. 22–23 (Russell's Introd.).

The false premise which engenders this paradox is the supposition that there is such a thing as *the* form of anything. A logical form is always relative to a system; a logical term or complex of terms without reference to any particular system is as meaningless as a word or phrase without reference to any particular language. Thus *the* form of an object, if taken to denote a single absolute notion, suffers from the same sort of non-significance as *the* name of an object, which Messrs. Whitehead and Russell deal with in *Principia Mathematica*.[5] But, whereas a name is necessarily just one definite name, quite obviously dependent for its significance upon some principle of naming, the "form" is a more difficult notion and its relations are not so evident. What we have in mind when we speak of *the* form of anything, is probably the class of all possible forms under which the object in question can be conceived; these forms being of various degrees of simplicity, *i.e.*, abstraction, from the emptiest to the most differentiated. Only in some such sense as this could we speak of *the* form of an object.

But such a class of forms proves upon inspection to be just one more "illegitimate totality" of the sort discussed in *Principia Mathematica*. For a hierarchy of forms, each presupposing and supplementing the one beneath it in order of complexity, assumes a single system wherein all these forms are conceived. But an object may be analyzed into forms which do *not* presuppose each other, and which are neither supplementary nor contradictory one to another, but simply incommensurable. Professor Whitehead has called attention to this common fallacy of systematization and pointed out the fact that different principles of analysis give rise to radically diverse forms, and that these do not form a hierarchy of abstractions.[6]

logical language.

The problem of language is a troublesome one in logic. Language (verbal or non-verbal) determines by its structure just the sorts of concept, *i.e.*, the forms, which can be expressed in it. And whatever object we are talking about, we are limited to some definite language, with its idiosyncrasies of structure, and consequently we are limited as to the things we can say. There is no "Interlingua" which is an

[5] Ch. II.

[6] *An Enquiry Concerning the Principles of Natural Knowledge*, pp. 59–60 (1st ed.): "It is not merely that one mode of diversification of nature is incomplete and leaves out some entities which another mode supplies. The entities which are yielded by different modes of diversification are radically different. . . . Thus each mode of diversification produces natural elements of a type peculiar to itself.

"One mode of diversification is not necessarily more abstract than another."

Every form is relative to a system, or—which is the same thing—to a

abstraction from languages; we can use only one language on each occasion, and we must use just one. It is this provincialism of language that has made Mr. Wittgenstein despair of any philosophical, that is to say, truly general, propositions. Since the logical forms we can designate are determined by the language, or medium of designation, what holds for language holds also for logical forms; if, as Mr. Russell maintains, there could be a *hierarchy* of languages but no *totality* of them, then even if there were a hierarchy of forms exemplified by any object there yet could be no totality of these. Therefore we can not take "the form" to denote the class of forms, because this is an illegitimate whole.

Thus the relation of form and content is not the unqualified, ultimate, two-termed relation which it is generally thought to be. If "form" always means *a* form, then content always means *a* content, because content is relative to form; content means "that which is not given as part of *this* logical structure."

Our problem, then, boils down to that of the relation between a logical structure and something which it does not include; between a form and the locus wherein it meets or conflicts with other possible forms. If there is more to "content" than just this penumbra of extraneous and irrelevant other structures, that more is not communicable and not cognizable—since we can not know what can not (in *some* language) be talked about. Such a truly alogical content could really not be conceived as entering into a logical relation, even if in some supramundane fashion it existed.[7] We can not even say that the content is the residue of all possible structures after a chosen one has been set aside, because "all possible structures" do not exist. We have simply a relation between a form which is explicable in the given language, and the possibility of others which are not. This is analogous to the relation obtaining between logical systems themselves, or logical languages as such, which Mr. Russell touched upon in his discussion of Mr. Wittgenstein's views. But such a relation, abstruse and complex as it may be, exhibits no true paradox, and therefore does not necessarily invite our mystical contemplation.

SUSANNE K. LANGER.

WORCESTER, MASS.

[7] Just such a content is Kant's Thing-in-itself; it can not really be related to the phenomenon because all the categories of form and relation are foreign to it. That is why many philosophers have condemned it as an unprofitable notion.

BOOK REVIEWS

The Reasonableness of Christianity. DOUGLAS CLYDE MACINTOSH. New York: Charles Scribner's Sons. 1925. Pp. xviii + 293.

This volume, which received the Bross Prize for 1925, sets forth a profound and closely reasoned defence of Christianity from the standpoint of contemporary philosophical realism. The first ten chapters define and defend the "essence" of Christianity, while the remaining three deal with the theory of knowledge, religious knowledge, and the general nature of reality. The title obviously suggests comparison with Locke. Like Locke, the author defines what he believes to be the essence of Christianity, apart from accidental accretions, and seeks to show empirically the reasonableness of this essence. However, the "essence" defended is quite different, as well as the arguments in its favor.

"Reasonableness," the author thinks, may be claimed for ideas that are theoretically permissible, being consistent with one another and with known facts. If such ideas and ideals possess practical value, they deserve consideration as hypotheses. Hypotheses, when found to accord with empirical evidence, may be regarded not only as reasonable, but also as probably true (pp. 17–24.) The essence of Christianity is "moral optimism"—the doctrine that the highest spiritual values are practicable, progressively realizable, and ultimately conserved in the universe through the Supreme Power on whom man is dependent. The problem, therefore, is to show that this hypothesis of moral optimism, or "religious meliorism" (p. 46), together with its implications, is reasonable and probable (Chap. III).

The implications of moral optimism include human moral responsibility, creative freedom of the human will, personal immortality, and a personal God. God must be supposed to be omnipotent, omniscient, and omnipresent in the "practical" sense that He assures the progressive realization by man of higher values, when man coöperates with Him in this end (Chaps. IV–VI). The author formally rejects "mere meliorism" and the finitude of God. He thereby avoids the risk of being confused with Mr. H. G. Wells and others who have advanced these doctrines in absurd and fantastic forms. However, one who rejects the Absolute, and believes that the universe is developing in time, and who affirms optimism only in a "moral" sense, and the infinitude of God only in a "practical" sense, can not be far from the more moderate conceptions of meliorism and a limited God advocated by James and various other theists of our time.

The empirical evidence is found to be favorable to the hypothesis of moral optimism and its implications. Some evidential value is afforded by the fact that men tend to be moral optimists when

physically and mentally at their best. Scientific evidence makes human freedom of initiative and human immortality at least possible. The general course of evolution on the earth indicates an environment favorable on the whole to human realization of the higher values. Such evil as man himself is not responsible for can be supposed to be inevitable on a planet where man is to develop as a free moral agent (Chap. VII). The general course of evolution may be taken to be indicative of a God who thereby affords a "general revelation" of Himself, while the facts of religious experience are "special revelations" to all who will fulfill the necessary conditions (Chap. VIII).

The essence of Christianity, it will be observed, is formulated without reference to the question whether and to what extent Jesus is an historical character. The historicity of Jesus is not essential to Christianity; however, in the form held by liberals, it is fairly certain, and affords additional support to the claims of Christianity to reasonableness and probability (Chaps. IX, X).

The feature of most interest to philosophers in the three concluding chapters is the author's exposition of his own version of "critical realism" (pp. 163–206). This was originally prepared for the coöperative book of *Essays in Critical Realism*, but proved too divergent from the contributions of the other writers to make its inclusion practicable (page 216, note). The author calls his own position "critical monism" as *versus* "epistemological dualism." He seeks to maintain continuity in some respects between percepts and physical objects, although he concedes their disparateness in others. He believes in an existential or numerical oneness between the perceived object and independent physical reality. Primary qualities inhere in physical objects, whether perceived or not. Secondary qualities are spatially present in physical objects when perceived, but do not exist independent of perception. Tertiary qualities (not necessarily values) belong to an object only by virtue of our thinking and willing, and not of our perceiving—*e.g.*, naming, erroneous thinking (p. 205, note). The doctrine of "essence" as advanced by certain of the critical realists is a merely abstract logical essence, connoting quality alone and not existence. The author, on the other hand, conceives essence pragmatically and concretely: in many cases essence includes existence (pp. 198–201). Truth *is* some sort of representation of reality by idea, as intellectualists maintain; but the *test* of truth about reality is ultimately a practical test in the sense of pragmatism (p. 212). The author thus retains the happy compromise between intellectualism and pragmatism advanced in his previous writings, and here effectively combines it with his monistic version of critical realism.

The classification and criticism of the various forms of contem-

porary idealism and realism is done with remarkable lucidity and compactness (pp. 168–193). This will afford a convenient reference for graduate students. The religious import of each of these positions is developed to its logical conclusions. Subjective idealism leads to the conclusion that "the only God is the God-idea, a subjective content of man's mind," and only escapes agnosticism to land in atheism (pp. 219 f). Abstract or logical idealism maintains that abstract ideas or ideals are the eternal validities (pp. 171, 186, with reference, the reviewer supposes, to certain contemporary neo-Kantians). This view regards God, not as an independently existing Reality, but as the eternally valid spiritual Ideal. A God that is only "a grand Ideal," and does not really exist, is not accessible to personal religious communion (p. 221). Absolute idealism does not afford a God operative in human temporal affairs and available as an object of intelligent worship or trust (pp. 233 f). The implications of various forms of pragmatism (pp. 22–24, 229–235 and neo-realism (pp. 188–191, 208 f) are likewise analyzed and found both logically inconsistent and religiously unsatisfactory. Only a critical realism of the monistic type (that at once recognizes the separateness between individual minds, physical objects, and God, and yet acknowledges a continuity between them) can afford a philosophical validation of religious experience.

Hasty readers should be warned that, in spite of the seemingly popular tone of the earlier chapters, this is not only an extremely condensed but a profound book, which can not be digested rapidly. It is necessary to go over many discussions repeatedly, to be sure of their implications. For instance, it seemed to the reviewer at first that in some passages values were relied upon to establish existence—a position hardly consistent with the criticisms of Ritschlianism, neo-Hegelianism, and the less logically rigorous forms of pragmatism. However, on further study, the reviewer believes that the argument is throughout consistently maintained on the lines he has outlined above. "Reasonableness" nowhere is said to afford even probable truth until it has been corroborated by empirical evidence. If the reviewer's interpretation is correct, he is in general agreement with this volume. Perhaps he would not be quite so severe from a religious standpoint on all of the forms of philosophy rejected. He is ready to accept what is defined as "moral optimism," together with its implications, but he would call this "meliorism combined with belief in a limited God"; however this is probably only a difference in terminology. This book is certainly an important contribution to the philosophy of religion and deserves to be widely read. It is significant that a theologian, after sounding the depths of the various contemporary idealisms, realisms, and pragmatisms, finds in one form of metaphysical realism, in union with

the pragmatic use of hypotheses, the only philosophical standpoint capable of vindicating in our time the reasonableness of Christianity.

WILLIAM KELLEY WRIGHT.

DARTMOUTH COLLEGE.

Religious Values. EDGAR SHEFFIELD BRIGHTMAN. New York: The Abingdon Press. 1925. Pp. 285.

Contemporary religious thought discloses a cleavage between the preoccupation with the adjustment of human, social relations and the absorption in the concerns and designs of the supernatural. The positivist is apt to forget God; the theist, to forget man. Seeking to utilize the truth of both without lapsing into their errors, Professor Brightman, while ever keeping in mind the immediately human values of religion, undertakes in this volume a defense of metaphysics in religious thought.

The true character of any value, and the true value of religion, can be estimated only in the light of our total thought and experience. In the first chapter the author exhibits and defends the logical basis of religious values. Theistic belief, he holds, is not completely reasonable, but it is not incoherent; relatively more adequate and satisfactory than any other available view of the world, it is the most rational probablity, and is thus intellectually respectable (pp. 30–31). The study of the moral experience of obligation and the many efforts to explain it, which Professor Brightman examines, lead us to the recognition of its religious significance: "there is a road that leads imperatively from obligation to God" (p. 63). After a short discussion of truth and value in religion (Chap. III), the author turns to examine in the next two chapters the Human and the More-than-Human Values of Religion. This begins his constructive interpretation of religion. The main thesis seems to be that the human values of religion can not be retained if divorced from its more-than-human values. Religion is not mere subjectivity; only the more-than-human evokes in the end the characteristic religious attitude; only God, transcendent as well as immanent, can be the object of worship.

So this is the problem and the main issue: Is the religion of tomorrow to be positivistic or metaphysical? In his sixth chapter, which Professor Brightman calls "the watershed of the book," he inquires into the adequacy of various philosophies to interpret religious experience: Professor Dewey's instrumentalism and the New Realism have faith in progress, but appear to reject or ignore the more-than-human goal or standard of growth or perfection. Absolute idealism, particularly Bosanquet's speculative philosophy, aspires towards the more-than-human Whole, but its pantheistic view of the Whole excludes the intimate relation of worship which is so

fundamental to religion. Only in his personalistic philosophy does Professor Brightman find a really satisfactory interpretation of religion: a firm and rationally grounded trust in progress, growing perfection, personal immortality, a Supreme Divine Person, genuine religious communion between man and God in worship.

Chapters VII–IX are devoted to the central religious experience, worship: its meaning, its real value, its fruits in human life. The author's religious dialectic leads to his final synthesis, that worship is a conscious relation of the whole personality to God. Worship is creativity: it creates perspective, a spiritual ideal, power, a community of love. The attainment of these values requires "the preparation of the soul, conflict, self-possession, the vision of God, and the will of the worshiper" (p. 236).

This plea for the recognition of the metaphysical claims of religion ends with a demand for the fundamental place of philosophy in religious education (Chap. X). Here is religious faith that trusts in understanding: against dogmatism and scepticism alike, against the intellectually sterile emotionalism in religion and the superficial philosophies which ignore the deeper notes of genuine religious experience, Professor Brightman demands reason in religion, for he is convinced of its essential reasonableness. He travels debatable ground and some of his conclusions may be open to question or insufficient. To mention only one: the notion of God as Infinite Moving Perfection is one which Professor Brightman should have been less reluctant to adopt. But the significance and value of his main undertaking can not be gainsaid: his vigorous advocacy of the philosophical importance of the religious experience and of the important place of philosophy in religious thought and in the sound training of religious teachers. The book deserves a wide reading, and not only on the part of clergymen.

RADOSLAV A. TSANOFF.

THE RICE INSTITUTE,
HOUSTON, TEXAS.

Der Aufbau der Systeme. KARL GROOS. Leipzig: Felix Meiner. 1924. Pp. xi + 319.

This book puts before us the outcome of more than fifteen years' labor on the question of the formal structure of philosophic systems. Professor Groos views systems of thought from an angle comparable to that from which an art critic might view cathedrals; he examines the chief styles of philosophic architecture. Without saying, in the first instance, that one edifice is more beautiful, or more valid, than another, and without contemplating one edifice after another in chronological order, the author ranges at will among the great historic creations of the philosophic mind, and hunts out the formal

and stylistic elements that have entered into them. And he often lays his hand on the fact that two edifices, which might seem to present no similarity at all to the superficial eye, do indeed embody a single style of construction.

The general contention of the author is that the philosophic mind sets up antitheses, and then strives to overcome them. As anyone knows who is acquainted with the history of thought, the ancient Greeks struggled with dualities such as hot and cold, rarefaction and condensation, love and hate, dry and moist, limited and unlimited, odd and even, unity and multiplicity, reason and the world, truth and opinion, the full and the void, nature and convention, thought and sense. Plato's thought revolved round dualities such as idea and matter, permanence and change, knowledge and opinion. The thought of Descartes, and much of that of his successors, was occupied with dualities such as God and the world, soul and body, innate and adventitious ideas, the teleological and the mechanical. In still more recent times, the thought of Kant centered round antitheses such as *a priori* and *a posteriori,* form and matter, understanding and sensibility, the transcendent and the phenomenal, belief and knowledge.

The human mind, while it sets up such dualities, does not willingly view them as final. And Professor Groos's specific thesis is that the mind, in its effort to overcome any fundamental philosophic duality, resorts to three main styles of construction. A thinker may reach a *radical* solution of his problem; he may simply strike out one side on the antithesis, as Fichte did in striking out the thing-in-inself. Or he may work out what the author terms an *interpolative* (*"interponierende"*) solution; he may keep both sides of the antithesis intact, and insert one or more intermediate terms between them, as Plato did when he placed *eros* between the sensible and the supersensible, the mortal and the immortal. Or, finally, a thinker may arrive at a *monistic* solution; he may, in effect, strike out both sides of the antithesis, may refuse to regard either of them as ultimately real, and may seek a "higher unity," as Spinoza did in reducing both thought and extension to the rank of attributes of a single ultimate Substance. The same thinker may, indeed, do more than one of these things in elaborating different parts of his system.

Now, as anyone can see, Berkeley is a good example of a thinker who proceeded by the radical method; he took the central Cartesian duality, struck away one side of it, and left only the spiritual substance. Hobbes did the opposite thing, leaving only the material substance. But Professor Groos finds any number of examples of this style of construction, not only here, but in other departments

of philosophic thought. The mind, indeed, in some of these departments, works radically in one direction, but not in another. A thinker may, for instance, maintain that the root principle of the world is entirely good; but perhaps no one has ever maintained, in a serious philosophical treatise, that it is entirely evil; not even Schopenhauer did that. Again, a thinker may hold that human knowledge, in its origin and nature, is entirely sensuous; but no one has ever held, with any show of plausibility, that it is entirely non-sensuous or intelligible. Hermann Cohen did, indeed, attempt to do something of the sort; but not, according to Professor Groos, with the slightest success.

But the author, I think, sets forth his most interesting material when he talks about the interpolative style of philosophic thought. A thinker who constructs in this style endeavors to save rather than to destroy the terms of any fundamental duality, and to link them together in a hierarchy of being and knowledge. Now Plato is a plain example of a thinker who pursued this method, at least in a large part of his thought. Thus, between knowledge and ignorance, Plato inserted right opinion; between intellect and sense in the human soul, he inserted the spirited part (*thymos*); between Ideas and matter, he inserted sensible things, or rather below sensible things he added matter, the "receptacle of all generation." Again, Aristotle used an interpolative, combined with a genetic, style of thought, when he employed the notion of relative levels of materiality. Professor Groos follows this mode of thought among the Neo-platonists, and especially in Origen, with his strange notions of universal apocatastasis and the succession of worlds. It would be interesting to see him go farther, and follow it into the Middle Ages; for he would certainly find there, in the system of Aquinas, a striking instance of this hierarchic style of construction.

In considering the monistic style of thought, the author fastens his eye especially on the question of mind and body. A monist, as here understood, is a thinker who seeks not merely a unity, but a higher unity; a unity which has a reality of a higher grade than that of the things it is supposed to unite. An obvious example here is Spinoza, with his grand conception of a single Substance. But what does Spinoza mean? Have we, in what he terms thought and extension, two real sides of one real thing? Or have we two merely apparent sides of one real thing? two phenomena? one thing, but two modes of consideration? Or, as there is some reason for saying, have we a real thing in the case of extension, but no real thing in the case of thought? The same baffling style of construction is seen at work in Kant's treatment of purpose. From one view-point there is nothing but mechanism in the plant or animal; but from

another, there is finality there; but, nevertheless, there is a supersensible principle which is above, and at the basis of, both mechanism and finality. My own impression, strengthened by reading this exposition, is that the monistic mode of philosophizing is a veritable quagmire of ambiguity and equivocation.

Now, is one mode of construction as good as another? Is a philosophic system at best a merely imaginative arrangement of concepts? As I said before, the book is not primarily concerned with this question, but it comes round to it in the end. Professor Groos, indeed, goes about the statement of his own philosophy with the utmost caution. But we may say, I think, putting it briefly and dogmatically, that he holds that the right sort of philosophy is more than a poetic construction. He holds, in brief, that the dualities with which the philosophic mind struggles are in fact rooted in being itself: that there is a duality of attracting and repelling forces in nature; a real duality of mind and body; indeed, though it is hard to prove, a duality of absolute and relative being. In short, the author regards the interpolative view, combined perhaps with a monistic view of the beginning and end of all things, as the most valid style of metaphysical construction. In this book, as in other recent writings, he sets forth as highly probable, though not fully susceptible of proof, the conception that the universe is a plurality of beings and forces, held together in a single, and in some sense spiritual, hierarchy.

But it would be wrong to lay the final emphasis on Professor Groos's own views. The book is not systematic, but historical. How to classify the great historic systems is indeed a hard question. I am not sure that Professor Groos's answer is, in all respects, the best that could be devised; in particular I feel some doubt about the two categories called radical and monistic; for, as the author himself points out in several places, they appear not to be mutually exclusive. But this point is not as vital as it might seem to be. One may perhaps entertain a doubt as to the precise pigeonholes with which Professor Groos operates, but one can hardly fail to admire the skill and learning with which he fills them with material culled from the most diverse regions of the history of thought. The book is written from an angle at once comparatively novel and genuinely significant, with great learning, and, considering the subject-matter, with a singular clarity of expression. I recommend it to the reader who is concerned with the question of finding sense in the seemingly senseless variety of the products of the philosophic mind.

D. W. Fisher.

New Canaan, Conn.

JOURNALS AND NEW BOOKS

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NOTES AND NEWS

To the Editors of the Journal of Philosophy:

In your issue of July 22, Mr. Wm. Clark Trow devotes a paragraph to the 1925 reprint of my *Primer of Psychology.* My gratitude for this notice of a little book which received its critical appraisement a full quarter-century ago, and which might well have been passed by without comment, is somewhat lessened by the fact that Mr. Trow has mixed up the *Primer* with my *Beginner's Psychology.*

Since the preface to the reprint is dated 1899, the book can hardly be, as Mr. Trow declares, the second edition of a work first published in 1915. It is, in fact, what I have called it above—a reprint of the last revised edition (1899) of the *Primer.* In the preface to the *Beginner's Psychology* I give my own view of the relation of the two books, and state that the *Primer* is not to be further revised.

These facts may, perhaps, serve to blunt the edge of some of Mr. Trow's criticisms. Dr. Watson, *e.g.,* took his doctor's degree in 1903. Ought I really to have quoted him in 1899?

E. B. Titchener.

Cornell University.